BAA 00-17

Sensor Integration and Modeling for Biological Agent Detection

(SIMBAD)

March 21, 2000

Proposer Information Pamphlet (PIP)

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1 PROPOSER INFORMATION

The Defense Advanced Research Projects Agency (DARPA) often solicits research efforts through the Broad Agency Announcement (BAA). The BAA is announced in the *Commerce Business Daily*, published by the U.S. Government, Department of Commerce. The following information is for parties interested in responding to the BAA.

It is the policy of DARPA to treat all proposals as competitive information and to disclose the contents only for the purposes of evaluation. The Government evaluation team will consist of Government personnel from DARPA and other Government agencies. For this solicitation, non-Government advisors from Booz, Allen & Hamilton Inc., who have signed appropriate non-disclosure and conflict of interest statements, may assist in the proposal administration and review process when their particular expertise is required; however, they will not participate in the final source selection process.

DARPA requires that all parties interested in participating in this BAA register their organization by providing a principal point of contact, phone number, fax and email to baa00-17@darpa.mil with the SUBJECT LINE: SIMBAD POC INFORMATION. Unless specifically requested otherwise, a listing of all registered organizations and point of contact information will be provided to all who register. Bidders will receive email confirmation of their registration. Potential bidders who have registered during the pre-BAA comment period should not register again if they have received email confirmation of their registration.

A list of the principal points of contact will be distributed by DARPA to registered potential bidders. In addition, DARPA will request that each organization interested in participating in this BAA provide a brief statement of interest and capabilities, not to exceed two pages. Instructions for providing the statement of interest will be provided to each registered point of contact. The statement of interest, along with the contact information, will be posted to a password-protected DARPA website. Each principal point of contact will be provided password-controlled access to this website. In addition, DARPA will host a bidder's conference (see Section 7, Procurement Schedule and Submissions Procedures). During this bidder's conference, DARPA will provide an opportunity for potential bidders to make short presentations regarding technical capabilities and areas of interest relative to this solicitation. Instructions regarding the procedures for these presentations will be provided to registered bidders.

2 PROGRAM BACKGROUND

Biological warfare (BW) is the use of pathogens or toxins for military purposes. BW agents are inherently more toxic than chemical warfare (CW) nerve agents on a weight-for-weight basis and can potentially provide a wider area of coverage per pound of payload than CW agents. Moreover, they are potentially more effective because most are naturally occurring pathogens – such as bacteria and viruses – that are self-replicating and have specific physiologically targeted effects; conversely, nerve agents are manufactured chemicals that disrupt physiological pathways in a general way.

Current and emerging sensors for biological weapons defense (BWD) have been developed primarily for military customers. During development efforts, emphasis has been placed on size and weight reduction, with demonstration through field trial as the primary performance metric. In this process operator input has been heavily valued. To better understand, and ultimately improve the current performance of BW sensors, a more rigorous engineering approach is required.

Under the SIMBAD program DARPA seeks to develop well-characterized sensor systems for BW and CW agent detection. These well-characterized sensor systems may be developed by maturing current and emerging BW and CW sensor technologies or developing new technologies as required. In this context, a sensor system is a complete end-to-end capability of fully integrated technologies capable of monitoring the environment and providing an automated decision output regarding the presence or absence of a threat. As part of producing fully integrated and well-characterized sensor systems, this effort will develop tools and methodologies that result in a significant increase in our understanding of these systems and technologies. This increased understanding will include the ability to produce detailed performance predictions (Detection Probability (P_d), False Alarm Probability (P_{fa}), Receiver Operating Characteristics (ROC), etc.) for a wide range of applications: military and civilian; domestic and foreign; indoors and outdoors. DARPA believes this expertise and understanding can be achieved through the formation of multi-disciplinary teams, or consortia, consisting of such disciplines as biology, chemistry, medicine, mathematics, physics, fluid dynamics, computational science, and engineering, including systems engineering. We seek a comprehensive effort to develop, build, model, validate and optimize the performance of current and emerging sensor technologies in order to produce sensor systems that provide an extension of our capabilities to standards of performance and understanding which far exceed the current state of the art for CW and BW sensors.

The main goal of the SIMBAD program, as described in Work Area 2, Task Element 2, is:

a) To develop well characterized, optimized, fully integrated BW and CW sensor systems by maturing current and emerging sensor technologies, and developing new technologies as required. BW agent sensor systems are the primary goal, with CW agent sensor systems a secondary goal. The ultimate product of SIMBAD is one or more fully integrated and well-characterized sensor systems capable of responding to both the preliminary threats defined in this document and additional threats and sensor requirements which will be defined during the duration of the SIMBAD program.

As part of achieving the main goal, several other supporting goals must be achieved, also described in Work Area 2. These are:

b) To develop engineering models for the widest possible array of current and emerging CW and BW sensor systems at a level of detail that permits both component-level and system-level optimization and performance prediction. (Work Area 2, Task Element 2.)

c) To develop protocols for validation of both the component-level and system-level sensors and sensor models. This validation must include models, experimental model validation and direct experimental validation of sensor performance. Innovative methodologies for characterizing sensor performance against live agents and real clutter, interference and backgrounds are an important element of the SIMBAD program. (Work Area 2, Task Element 2.)

Finally, sensors can only be developed, optimized and evaluated in the context of specific threats to which they are designed to respond. Therefore, several other supporting goals of the program are:

d) To develop a sufficiently detailed engineering description of the threat – corresponding to several realistic scenarios – to support both measurements and prediction of sensor component and sensor system response to this threat (Work Area 1).

e) To evaluate (using measurements and predictions) both sensor component and sensor system response to the threat under conditions corresponding to several realistic scenarios (Work Area 2, Task Element 2).

3 PROGRAM OBJECTIVES

3.1 Main Goal

Under the SIMBAD program DARPA seeks to develop teams with the broad expertise required to develop, model, characterize and validate BW and CW sensor performance in direct support of the maturing of sensor technologies into well-characterized sensor systems. To this end, it will be necessary for the selected performers to have access to the widest possible family of BW and CW sensor technologies with potential for application to DoD missions. Consequently, broad collaborations are encouraged to ensure that the teams have access to the appropriate sensor technology, intellectual property and system engineering expertise.

3.2 Supporting Goals

It is anticipated that, at a minimum, the analysis developed to meet the supporting goals outlined in Section 2 will produce:

1) Modeling sensor operation in a variety of backgrounds, both inside and outside; and in a variety of applications, both civilian or military;
2) An evaluation of sensor and sensor system sensitivity with specific estimates for false alarms in the presence of a variety of interferants;
3) A model-based understanding of all critical elements of the sensors and sensor systems at a level of detail that permits optimization of item 2;
4) Protocols for fully characterizing sensor (component and system) behavior for validating sensor models;
5) Estimates of sensor system performance against threat scenarios in units relevant to human exposure risk;
6) An understanding that permits extrapolation of the validated models and results to new environments;
7) An understanding of the sensors and sensor systems to allow prediction of the performance of multi-sensor networks; and
8) Flexibility to respond to new threats. This includes the ability to extrapolate performance against new threats for sensors currently under evaluation, as well as applying the SIMBAD methodology to identify or develop additional sensors to meet new threats.

In addition, the analysis should include an evaluation of the life-cycle cost and mission applicability of the sensor technologies under consideration for a range of missions.

4 TECHNICAL SCOPE

4.1 Overview of the Work Areas

Performance under this BAA will take place under three separate Work Areas. Work Area 1 is designed to support the primary SIMBAD program thrust of Work Area 2, Task Element 2. Work Area 2, Task Element 2, is the dominant focus of the SIMBAD program. Performers may bid either Work Area 1 or Work Area 2 or both Work Areas 1 and 2. Work Area 3 provides a short-duration opportunity for limited funding to organizations not bidding under either Work Area 1 or Work Area 2, but with the potential to contribute to teams in Work Area 2. Under Work Area 3, performers will execute the work necessary to make the value of their potential contributions to Work Area 2 teams apparent.

Work Area 2 will be executed in two phases. Work Area 1 will be executed in parallel to Work Area 2 as a single, incrementally funded effort and will not be separated into phases. Work Area 3 will be executed in parallel to Phase I of Work Area 2. Figure 1 provides an overview of the schedule of the various Work Areas and Phases.

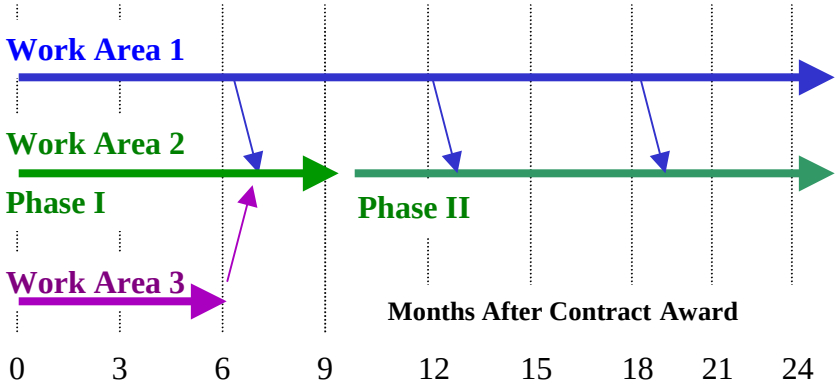

Figure 1. Work Area Schedule Overview

4.2 Work Area 1: Modeling and Characterization of Threat Scenarios, Backgrounds and Detection System Architectures

Under Work Area 1, performers will model and validate (or empirically characterize) the threat, threat fate and transport, environment and other key factors that impact sensor performance (e.g. temporal and spatial distributions of the threat). This analysis will be provided to performers under Work Area 2. It must directly support an evaluation of detection performance for a system of BW and CW sensors.

Work Area 1 will be executed in parallel to Work Area 2 as a single, incrementally funded effort and will not be separated into phases. The objective of this Work Area is to

develop the engineering detail of threat scenarios to provide a realistic, well-characterized context for the evaluation and optimization of sensors and sensor systems. The empirical and model-based descriptions of these scenarios must adequately represent both the temporal and spatial characteristics of the threat as well as the background. A notional threat scenario would, at a minimum, require characterization of the following five elements:

1) CW or BW threat agent used;

2) Method employed by the attacker to deliver the agent;

3) Physical configuration of the "target" environment;

4) Fate and transport of the agent; and

5) Environmental background (interferants and other sources of clutter).

Figure 2 displays a notional view of the elements of the BW/CW threat scenario driving a particular sensor system configuration. The effort under Work Area 1 must address each component of the threat specification. Each component model must use realistic or empirical data, and fully explore the possibilities that may be seen in an operational environment. Further, to provide a figure of merit to measure the detected threat levels, performers must provide a capability to evaluate human threat exposure levels in the context of the threat scenario.

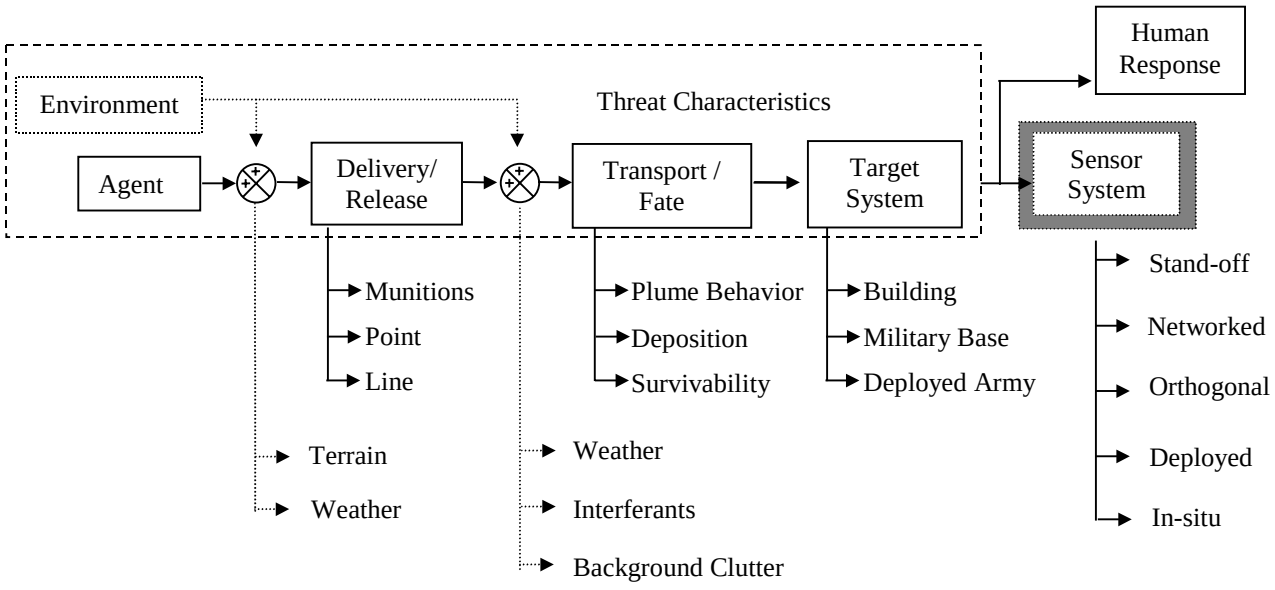

Figure 2. BW/CW threat system components

The two broad threat scenarios provided below must be fully analyzed by Work Area 1 performers. Bidders are encouraged to propose additional threat scenarios for analysis. These additional threat scenarios should be either relevant to specific national security concerns, or useful for a more comprehensive evaluation of sensor system performance. DARPA, or the performers with DARPA approval, may elect to add additional threat scenarios for evaluation in the future.

4.2.1 Threat Scenario 1: Point BW Attack Against a Military Target

The first scenario is a point release of a BW agent delivered against a military target, such as a group of soldiers, in an open outdoor environment. A thorough analysis of this threat will, at a minimum, include parametric studies of various potential local topographies, meteorological conditions, environmental backgrounds, and time and relative location of attack and target. A single realization of this threat will be provided to Phase I, Work Area 2 performers at time of award by DARPA. This realization will include a description of the agent concentration as a function of space and time over the region of interest. Work Area 1 performers will provide subsequent threat descriptions.

4.2.2 Threat Scenario 2: Urban/ High Density Target

The second scenario is a BW attack against a building in an urban/high-density setting. The notional target is a military office building with a centralized, forced-air heating, ventilating and air conditioning system. A thorough analysis of this threat will, at a minimum, include: parametric studies of meteorological conditions and environmental backgrounds; release point; temporally based analysis of agent motion and fate in the area around the building and as it infiltrates the building.

A single realization of this threat will be provided to Phase I, Work Area 2 performers at time of award by DARPA. This realization will assume the threat is released inside the building. The realization will include a description of the agent concentration as a function of space and time in two rooms: the release room and an adjoining room. Work Area 1 performers will provide subsequent threat descriptions.

4.3 Work Area 2: Sensor Integration and Modeling for Biological Agent Detection (SIMBAD)

Work Area 2, Task Element 2, is the dominant focus of the SIMBAD program. The two separate Task Elements are described below:

1) Development of the SIMBAD Program Plan.

2) Development, Modeling and Validation of BW and CW Sensor Systems.

Under the SIMBAD Program Plan (Task Element 1) performers will develop and update a detailed plan for the execution of Task Element 2. This plan will evolve under

the direction of DARPA to respond to emerging threats and evolving sensor technologies at regular intervals during the program.

Under Development, Modeling and Validation of BW/CW Sensor Systems (Task Element 2) performers will produce well characterized and validated sensor systems. As part of doing this, performers must develop and validate models for BW and CW sensor systems and their components. To provide a basis for the sensor modeling and characterization, performers will be provided specified threat scenarios, which will include the temporal and spatial distributions of the threat, characteristics of the background and other key factors that impact sensor performance. All new technology development will follow the model-based approach for sensor development and characterization described in this PIP. This Task Element will result in sensor technologies that are sufficiently well understood so that individual sensor performance can be predicted and optimized, and well-characterized sensor systems can be developed. The Government anticipates that this Task Element will form the dominant focus of the effort under this BAA.

4.3.1 Task Element 1: Program Plan Development

An underlying objective of the SIMBAD program is to evaluate the widest possible range of current and emerging BW and CW technologies for possible incorporation into the sensor systems produced. The specific technologies to be integrated into sensor systems as part of Work Area 2, Task Element 2, are determined by the performers, based on their expertise, experience, and innovation. Therefore, it is the responsibility of bidders to provide in their proposal an initial Program Plan, detailing each BW and CW sensor system, sensor component, or class of sensors they propose to develop, as well as their proposed work plan to integrate these into the well characterized and optimized sensors systems that are the product of the SIMBAD program. The proposed work plan must clearly differentiate the activities to be performed in Phase I from those for Phase II (see Section 5.2). In both cases, it will provide a roadmap outlining the steps necessary to develop the technology components, characterize and model the sensor, validate the model, optimize the modeled sensor, and integrate the optimized sensor components into a sensor system.

Once proposals are awarded under Work Area 2, the performers will periodically update their Program Plan based on their progress and on Government input. These updates constitute Task Element 1 during Phase I and Phase II.

Performers selected under this BAA will brief their proposed Program Plan at a kick-off meeting. This original plan consists of two parts, as described in more detail in Section 4.3.2: (1) the activities planned for Phase I, Task Element 2, described in great detail in the proposal and at the kickoff; and (2) the activities planned for Phase II, Task Element 2, described in somewhat less detail. At the kickoff meeting, DARPA will provide both oral and written feedback on this briefing. DARPA may redirect the

performers in their Phase I, Task Element 2, activities, and will provide guidance on modifying the plans for Phase II, Task Element 2. During the nine-month duration of Phase I, the performers will update their Phase II plans; this activity constitutes Task Element 1 for Phase I. The performer will schedule a mid-term briefing of the updated Program Plan during Phase I for Government review. A final version of the Program Plan is the deliverable for Phase I, Task Element 1. As part of the proposal, performers must define deliverables for Phase I, Task Element 2. If performers are downselected to continue into Phase II, the Phase I, Task Element 1 Program Plan deliverable will form the basis for their initial work under Phase II.

During Phase II, the Program Plan will be updated with Government input every six months and delivered as both an oral briefing and a written report; this activity is Task Element 1 of Phase II. During Phase II, the Government may elect to update the threat scenarios at each biannual update (see Work Area 1 for a discussion of threat scenarios); in such cases, the updated Program Plan that is the deliverable for Task Element 1 must reflect the new threat scenarios. Performers may submit additional team members or sub-contractors for DARPA approval at each biannual Program Plan update.

4.3.2 Task Element 2: Development, Modeling and Validation of Sensor Systems

Under Task Element 2, performers will execute the performer-defined tasks identified in the SIMBAD Program Plan (Task Element 1). The ultimate product under this Task Element is one or more well-characterized, optimized, fully integrated BW and CW sensor systems created by maturing current and emerging sensor technologies, and developing new technologies as required. Performers are required to develop, model and characterize BW and CW sensors with sufficient fidelity to permit optimization and performance prediction.

Execution of Work Area 2 for the SIMBAD effort will occur in two separate phases. Phase I will last nine months. At the beginning of Phase I, performers will be provided two detailed threat descriptions (described in Section 4.2). To execute Phase I, Task Element 2, performers will use one or both of these threat descriptions to carry out the development, modeling and validation of a single sensor or sensor component of their own choosing, from those listed in Phase II, Task Element 2, along with an evaluation of its performance against at least one of the initial threat scenarios. The sensor or class of sensor selected for the initial nine-month effort should be chosen to best exemplify the team's capability to execute the goals of Work Area 2 under the SIMBAD program. In addition, the nine-month effort should be integrated into the multi-year Program Plan that forms the basis for this proposal and that is modified during Phase I as Task Element 1.

Performers will be selected to continue into Phase II based upon an evaluation of the Phase I work. Phase II will have an initial duration of two (2) years, with options for additional years, and will be incrementally funded, pending available funds, to fully

execute the Program Plan developed in Task Element 1, as updated with periodic direction from DARPA (see Section 4.3.1).

In Phase II, performers propose (via Task Element 1) an explicit list of sensors or classes of sensors to be developed, modeled and validated. Once the Government approves the proposed Program Plan, under Task Element 2 performers develop the technologies (as required), model technology behavior, characterize performance, and validate models – for sensor components and for integrated sensor systems. It is anticipated that the critical components may include, but are not limited to, high-volume air samplers, trigger sensors, sample collection technology, stand-off sensors, core BW and CW detection technology, signal-transduction mechanisms, and algorithms and signal processing. Performers may elect to model individual sensors or classes of sensors as deemed appropriate.

A key goal of this Task Element is to identify the critical elements that drive sensor system performance. To this end, the modeling of each of the components should provide insight into not only how the component works but also how the component interacts within the sensor system. The models should be sufficiently detailed to capture the critical phenomena that contribute significantly to sensor performance. In addition, the models should be sufficiently robust to enable parametric studies of sensor performance and ultimately, sensor component and sensor system optimization. Further, the performance characterizations, models and the model validations must clearly address the impact of backgrounds and interferants on sensor performance.

Under this Task Element, performers will be provided specific threat scenarios, which will include the temporal and spatial distributions of the threat, characteristics of the background and other key factors that may impact sensor performance. Work Area 2 performers will be required to contribute to the identification of the key factors and characteristics that must be included in the threat information provided under Work Area 1 to fully characterize the sensors under investigation.

Performers will evaluate sensor performance against the specific temporal and spatial threat scenarios provided by DARPA. As part of carrying out this evaluation, performers must develop a methodology (protocol) to validate sensor component and sensor system performance against the threat scenarios, using laboratory and/or field experiments. A rationale for the relevance of the selected laboratory and/or field validation experiments to the full threat scenarios must be provided. Further, performers must develop strategies for characterizing their sensors against realistic backgrounds.

As described earlier in Section 4.3.2, the work carried out under Phase I must include an evaluation of the sensor under development against at least one of the threat scenarios provided at the kickoff meeting; this is part of Phase I, Task Element 2. This Phase I threat evaluation may include either a model based or more comprehensive model and experiment based evaluation. Under Phase II, performers will be responsible for

evaluating their products against an expanded set of threat scenarios, for example as a result of the work carried out separately under Work Area 1 (see Section 4.2). This evaluation must include models, experimental model validation and direct experimental validation of sensor performance. Innovative methodologies for characterizing sensor performance against live agents and clutter, interference and backgrounds are an important element of the SIMBAD program.

Performers may incorporate into this Task Element limited investigations of specific threat scenarios either directly relevant to their sensor technologies or of high interest to U.S. national security. Under Work Area 2, these investigations should be limited relative to the overall scope of the Work Area 2 effort. More significant efforts in this area should be separately proposed under Work Area 1.

For each of the activities under this Task Element, the proposal should, at a minimum, describe the approach, present factors affecting task execution, identify performer resources for addressing these factors (e.g. modeling and measurement capabilities), describe deliverables, and present an execution schedule.

4.4 Work Area 3: Additional SIMBAD Technical Contributors

Work Area 3 provides an opportunity for organizations that have elected not to bid under Work Area 1 or Work Area 2 to execute a limited-duration, highly focused task resulting in a final brief and final report 6 months after contract award. Proposals for Work Area 3 must define a task that exemplifies the offeror's potential contribution to SIMBAD Work Area 2. The primary purpose of this work area is to permit organizations not successful in teaming prior to Phase I to execute the work necessary to demonstrate their value as potential team members under Work Area 2. In addition to delivering the final report and briefing to DARPA, Work Area 3 performers must deliver their final report and briefing to at least one of the Work Area 2 teams.

5 PROGRAM SCHEDULE AND PHASES

5.1 Work Area 1

Work Area 1 (Modeling and Characterization of Threats) will be incrementally funded with deliverables due every six months. Work Area 1 will be executed in parallel to Work Area 2 and will not be separated into phases.

5.2 Work Area 2

Performance under Work Area 2 will take place in two separate phases. Phase I will represent a short-duration task of reduced scope and will last approximately nine months. At the end of Phase I, the Government plans to downselect some of the performers to go on to Phase II. Phase II will be awarded shortly after Phase I with a planned duration of two (2) years with options for additional years pending availability of funds. Table 7-1 in Section 7 defines the procurement schedule.

5.2.1 Phase I

During Phase I, selected performers will execute two Task Elements.

5.2.1.1 Task Element 1 – Program Plan Update

Phase I, Task Element 1, is an update of the Program Plan (see Section 4.3.1). The initial version of this Program Plan will be submitted as part of the proposal and will be briefed during a kick-off meeting. A Government team led by DARPA will provide both written and oral feedback of the plan. The performer will arrange for a mid-term briefing of the updated plan, which will again be reviewed by the DARPA-led Government team. A final version of the plan, including a detailed cost breakdown for execution, is a deliverable at the end of Phase I.

In anticipation of possible selection as a Phase II performer, Phase I teams may add new or delete existing members as part of their final updated Program Plan for Phase I.

5.2.1.2 Task Element 2 – Performer Defined Task

Phase I, Task Element 2, is the execution of a subset of Work Area 2, Task Element 2, defined by each bidding team in their proposal and refined in collaboration with DARPA (see Section 4.3.2). Bidders are strongly encouraged to define a work plan that provides a useful foundation for continued execution of the program if selected for Phase II, and that best exemplifies the bidders capabilities to meet the goals and objectives of the SIMBAD program, Work Area 2. The work plan, schedule and deliverables for Phase I, Task Element 2, must be clearly identified in the proposal.

5.2.2 Phase II

Under Phase II, the selected performers will execute their updated SIMBAD Program Plan delivered in Phase I, Task Element 1. The progress of the work defined in the plan should be reported in the form of an oral briefing on a quarterly basis. Quarterly briefings will be held jointly with all Phase II performers. The Program Plan (Task Element 1) must be updated every six months and be provided as both an oral and written report. An annual written report and an oral briefing to a DARPA-selected forum of Government, academic and industry participants are required.

Subject to DARPA approval, the selected Phase II teams may propose to add members to their teams during the normal biannual Program Plan update cycle. This may include Phase I performers not selected to participate in Phase II.

5.3 Work Area 3

Work Area 3 will be executed in parallel to Phase I of Work Area 2. A final report and final briefing must be delivered to DARPA and to at least one of the selected Work Area 2, Phase I performers no later than 6 months after contract award.

Table 4-1. Estimated Program Schedule and Deliverables

Work Area 1	◆→												→◆
Kick-Off Brief	◆												
Update Threat Descriptions for WA2 Performers[1]			◆		◆		◆		◆		◆		◆
Work Area 2	◆→												→◆
Phase I	◆→				◆								
Kick-Off Brief	◆												
Mid- Term Brief			◆										
Final Brief & Deliverables					◆								
Down Selection					◇								
Phase II					◆→								→◆
Phase II Kick-Off Brief					◆								
Quarterly Briefing						◆	◆	◆	◆	◆	◆	◆	◆
Biannual Program Plan Update							◆		◆		◆		◆
Annual Report & Community Brief									◆				◆
Work Area 3	◆→			◆									
Kick-Off Brief	◆												
Final Brief & Deliverables				◆									
Months from Start	**0**	**3**	**4.5**	**6**	**9**	**12**	**15**	**18**	**21**	**24**	**27**	**30**	

1. Note, the initial threat description for Phase I, Work Area 2 will be provided by DARPA. Work Area 1 performers will provide subsequent threat descriptions.

6 FUNDING STRUCTURE BY PHASE

Performance under this BAA will take place in three separate Work Areas. Under Work Area 1, the Government may elect to incrementally fund multiple performers. The table below provides an estimate of the level of funding.

Table 6-1. Estimated Funding Profile Per Award for Work Area 1

	FY00	*FY01*	*FY02*
Work Area 1[a]	**$300K**	**$300K**	**$300K**

[a] Estimated funding level per award, pending availability of funds.

Work Area 2 will be executed in two phases. Phase I will represent a short-duration task of reduced scope with an estimated funding level of $1,100K per team. The Government anticipates selecting up to four performers to participate in Phase I. Based upon performance during Phase I, and other criteria defined in Section 8, the Government may select up to two performers for continued funding in Phase II. Table 6-2 lists the total anticipated funding per award, by fiscal year. Pending availability of funds, it is anticipated that continued funding will be available to support two Phase II efforts beyond FY02. The funding level for Phase II performers will be adjusted each year based upon the Program Plan, but is currently estimated to be at approximately $3,000K per team. If warranted, based on the Program Plan, this funding level could increase substantially in the future.

Table 6-2. Estimated Funding Profile Per Award for Work Area 2

	Phase I FY00	*Phase I FY01*	*Phase II FY01*	*Phase II FY02*
Work Area 2[a]	**$400K**	**$700K**	**$1,500K**	**$3,000K**

[a] Estimated funding level per award, pending availability of funds.

Work Area 3 provides an opportunity for organizations with significant potential value to the SIMBAD program, who have been unsuccessful at joining a Work Area 2 team, to develop and demonstrate their potential to the core Work Area 2 teams during Phase I. This work area will be executed during the first six months of the SIMBAD program. Continued funding is dependent upon Work Area 3 performers joining one of the Work Area 2 teams. Multiple awards are anticipated in this area.

Table 6-3. Estimated Funding Profile Per Award for Work Area 3

	FY00
Work Area 3[a]	**$50K**

[a] Estimated funding level per award, pending availability of funds.

7 PROCUREMENT SCHEDULE AND SUBMISSION PROCEDURES

Offerors wishing to respond to this BAA will initiate the process by registering the name of their organization including a principal point of contact, phone number, fax and email address via email to baa00-17@darpa.mil. Future announcements will only be provided to registered bidders. Unless specifically requested otherwise, a listing of all registered organizations and point of contact information will be provided to all organizations that register.

To facilitate discussions related to teaming, DARPA requests that each organization provides a brief statement of interest and capabilities not to exceed two pages. This statement of interest, along with the contact information, will be posted to a password-protected DARPA website. The statement of interest may be linked to additional information as desired by each team. Each potential bidder who provides both contact information and a statement of interest and capabilities will be provided password-controlled access to this website. Instructions for providing the statement of interest will be provided to registered bidders via email.

In addition to providing an electronic forum to encourage teaming, DARPA will host a bidders' conference. The conference will take place on Monday, April 10, 2000, at the Hilton Crystal City at National Airport, 2399 Jefferson Davis Highway, Arlington, VA 22202, (703) 418-6800. During the bidders' conference, DARPA will provide an opportunity for potential bidders to provide a short brief of their capabilities and areas of interest to other conference participants. Bidders must register for the conference by sending an email (with the subject line "BIDDERS CONFERENCE," providing the name of the organization and including all attendees) to baa00-17@darpa.mil by no later than Wednesday, April 5, 2000. Bidders must include in this email a request to provide a briefing during the bidders' conference if desired. Additional instructions will be provided to those who register for the conference.

Proposals must be received at DARPA by 4:00 p.m. (local time), on the date due listed in the table below. Offerors should submit one (1) original and five (5) copies of their proposal via mail or hand delivery to DARPA, 3701 N. Fairfax Drive, Arlington, VA 22203-1714 (ATTN: BAA 00-17). Proposals submitted by fax or electronic mail will not be considered.

Table 7-1. BAA 00-17 Procurement Schedule

Date	*Event*
Fri Mar 24, 2000	BAA Published in CBD (on or before)
Wed Apr 5, 2000	Deadline to Register for Bidders' Conference
Mon Apr 10, 2000	Bidders' Conference
Fri May 12, 2000	Proposals Due
Fri May 25, 2000	Begin Selection Announcements
Thu Jun 8, 2000	Begin Work
Fri Feb 23, 2001	Final Phase I Deliverables Due
Fri Mar 9, 2001	Begin Phase II (Selection Announced)

8 PROPOSAL FORMAT

The title page for the proposal must reference BAA 00-17 and list the title, Work Area number, the proposal date, the name and address of the offering institution(s), the principal investigator's name, phone number, fax, e-mail if available, and address if different from the offering institution; the duration of the proposed effort; and the signature of an authorized official from the submitting institution(s). The proposal title page shall list all principal team members and subcontractors.

If applying for more than one Work Area, submit separate technical and cost proposals for each Work Area. Proposals shall contain technical and cost sections. The technical section for each Work Area shall be strictly limited to a maximum page count, not including the title page, table of contents, qualifications of principal investigators and key personnel. Both the technical and the cost sections shall be on single-sided, double-spaced pages; page size not larger than 8 1/2 X 11 inches; font to be not smaller than 12 point; one inch left/right margin, 1.25 inch top margin, 0.5 inch bottom margin on all sheets.

The Technical Section for **Work Area 1**, limited to 20 pages, must contain, but is not limited to the following:

- Title Page
- Table of Contents
- Executive Summary
- Program Plan (see Section 4.2)
- Schedule or Milestone Chart
- List of Deliverables
- Description of Facilities and Equipment
- Description of Prior Relevant Work
- Management Plan
- Qualifications of Principal Investigators and Key Personnel

The Technical Section for **Work Area 2**, limited to 50 pages, must contain, but is not limited to the following:

- Title Page
- Table of Contents
- Executive Summary
- Overall Program Plan (see Section 4.3)
- Detailed Plan for Phase I, Performer-Defined Task Element 2 (see section 4.3.2)
- Schedule or Milestone Chart
- List of Deliverables

- Matrix of Relevant Disciplines and Key Contributors/Team Members
- Description of Facilities and Equipment (Specifically include all test facilities relevant to this effort and identify any Government test facilities required.)
- Description of Prior Relevant Work
- Management Plan
- Qualifications of Principal Investigators and Key Personnel

The technical section for **Work Area 3**, limited to 10 pages, must contain, but is not limited to the following:

- Title Page
- Table of Contents
- Executive Summary
- Program Plan (see Section 4.4)
- Schedule or Milestone Chart
- List of Deliverables
- Description of Facilities and Equipment
- Description of Prior Relevant Work
- Qualifications of Principal Investigators and Key Personnel

The Cost Section shall include a cost summary and detailed cost breakdown. (For Phase II of Work Area 2, only a cost summary is required as part of the proposal. The detailed cost breakdown will be provided as part of the Program Plan update delivered at the end of Phase I). The cost summary should show the level of major tasks and should indicate manpower levels of effort (labor hours and cost), cost of equipment, travel, G&A and other miscellaneous expenses for the tasks of the entire program. Cost data for team members or subcontractors shall be identified under the appropriate tasks. Cost data for options should be presented separately.

Each cost proposal shall contain a section satisfying the requirements of the following: Awards made under this BAA are subject to the provisions of the Federal Acquisition Regulation (FAR) Subpart 9.5, Organizational Conflict of Interest. All offerors and proposed subcontractors must affirmatively state whether they are supporting any DARPA technical office(s) through an active contract or subcontract. All affirmations must state which office(s) the offeror supports and identify the prime contract number. Affirmations shall be furnished at the time of proposal submission. All facts relevant to the existence or potential existence of organizational conflicts of interest, as that term is defined in FAR 9.501, must be disclosed. This disclosure shall include a description of the action the Contractor has taken, or proposes to take, to avoid, neutralize or mitigate such conflict. If the offeror believes that no such conflict exists, then it shall so state in this section.

Only those offerors whose proposals are expected to result in contract award will be required to submit a completed and signed copy of "Representations, Certifications, and

other Statements by Offerors or Quoters." This document is not required for the submission of a proposal unless specifically requested. Offerors are notified that this document is frequently updated and any offeror selected for award may be requested to submit an updated "Representations, Certifications, and Other Statements by Offerors or Quoters."

NOTICE TO OFFERORS REGARDING CLASSIFIED PROPOSALS: DARPA does not currently anticipate that proposals will be classified. If performers choose to submit a classified proposal, classified submissions of proposals or portions of proposals should contain the facility CAGE code, classified mailing address, and the facility security officer's name and phone number. All classified responses will be mailed in accordance with the NISPOM dated January 1995, Section 5-403. The outer wrapping shall be addressed as follows: DARPA/SPO, 3701 N. Fairfax Drive, Arlington, VA 22203 (ATTN: BAA 00-17). The inner wrapping shall be addressed to: DARPA, 3701 N. Fairfax Drive, Arlington, VA 22203-1714 Attn: Dr. Steven Buchsbaum. Proposers must provide notification of their intent to submit a classified proposal to baa00-17@darpa.mil (preferred) or by written letter to Dr. Steven Buchsbaum (address above).

9 EVALUATION CRITERIA AND FUNDING PROCESSES

Proposals will not be evaluated against each other since they are not submitted in accordance with a common work statement. For evaluation purposes, a proposal is the document described in the Proposal Format Section provided above. Other supporting or background materials submitted with the proposal will be examined at the reviewer's convenience only and not considered as part of the proposal.

Evaluation of proposals for Work Area 2 will be accomplished using the following criteria listed in descending order of relative importance. Work Area 1 and Work Area 3 will be evaluated with the same criteria excluding criteria number 3.

1) **Meeting or exceeding the program goals.**
   An evaluation of the proposed Program Plan's likelihood to meet or exceed the SIMBAD program goals and objectives, defined in Section 2 and 3 of this Proposer Information Pamphlet (PIP). In particular, the evaluation will address the likelihood that the teams' effort will contribute to or result in a well-characterized sensor system for BW, and secondarily for CW, agent detection and identification.

2) **The overall scientific merit and technical approach**.
   The scientific merit and technical approach of the offeror will be evaluated against every element of the proposed effort. In particular, the following items will be considered and evaluated: scientific and technical merit of proposed approach, soundness of proposed work, and probability of success.

3) **The scope of technology encompassed.**
   The number and type of sensors that the offeror will examine, along with the range of specific technologies addressed, will be evaluated for relevance and long-term applicability. In particular, the sensors and technology proposed must be suitable now or in the future for use against BW or CW threats in both military and civilian environments.

4) **Offeror's capabilities, past performance and related experience.**
   The capabilities of the offeror to perform the stated work will be examined. In particular, the qualifications of principal investigators and their past performance on similar efforts will be considered. The breadth and relevance of test facilities incorporated into the bidding team appropriate to support the SIMBAD program will be evaluated. The range, depth, and mix of expertise of the offeror's key personnel will be evaluated to ensure that they are qualified in the theory and application of the technologies involved in the research and development related to the SIMBAD Program. The soundness of the proposed management plan will also be considered.

5) **Proposed cost and cost realism.**
Cost will be evaluated to determine whether the offeror's estimate is reasonable and realistic for the technical and management approach offered, as well as to determine the offeror's practical understanding of the effort. Cost reasonableness will be evaluated by assessing the number of labor hours and labor mix proposed, as well as the reasonableness of other cost elements (e.g. travel, materials, subcontractors, etc). Cost realism will only be used as an evaluation criteria if there is reason to believe that the offeror has significantly under- or over-estimated costs to complete the effort.

All awards made in response to this BAA will be subject to availability of Government funds. Evaluation and selection of proposal(s) for awards will be made to those offerors whose proposals are considered most advantageous to the Government. The Government reserves the right to select for award any, all, part or none of the proposals received in response to this announcement. All responsible sources capable of satisfying the Government's needs may submit a proposal, which will be considered by DARPA. Proposals identified for funding may result in a procurement contract, grant, cooperative agreement, or an Other Transaction Agreement depending upon the nature of the work proposed, the required degree of interaction between the parties, and other factors.

Based upon proposals received, DARPA may wish to negotiate options for follow-on technology development into resultant awards. Offerors who believe their technology solutions may afford opportunities for additional investigation or further development may wish to submit an option proposal along with their proposal for the basic effort envisioned within this BAA.

The Government anticipates including an unpriced option for Phase II in awards made in Work Area 2. The evaluation and selection of Phase II performers will be based upon the deliverables described in Section 10 as well as overall performance during Phase I. A detailed cost proposal for work to be performed in Phase II is part of the deliverable for Phase I, Task Element 1 (updated Program Plan for Work Area 2, for execution during Phase II).

10 REQUIREMENTS, REPORTS, AND DELIVERABLES

10.1 Security

A portion of the work to be conducted within this study will be **SECRET**. Although the PIP is unclassified, it is expected that portions of the work to be executed under this effort will require **SECRET** access. Therefore, at least two key personnel on the proposer's team must have a **SECRET** clearance and the team must have at least one facility cleared at **SECRET**. Potential offerors lacking this level of clearance are encouraged to team with organizations with the appropriate clearance levels. Personnel with appropriate security clearances, secure storage facilities, and secure computers are required. A draft security guide will be available at the time of the bidder's conference. This guide can be requested from Mrs. Vannessa Wilson-Baldwin (703) 465-2652, FAX 703-524-2449 at Booz Allen and Hamilton.

10.2 Reports and Deliverables

10.2.1 Fixed Schedule Reporting

Performers will provide monthly progress reports documenting progress on each task, coordination activities, and cost accounting. The cost accounting will present planned expenditures for the expected life of the contract, track commitments and expenditures to date (current costs), and project costs to completion. The planned and actual costs will be presented in monthly increments in a manner conducive to comparative cost tracking, including a graphical summary. Briefings, as well as interim and final reports will be provided in both hard and soft copy.

10.2.2 Work Area 1 Reporting

Performers under Work Area 1 will be required to provide a detailed report, including computer-readable data files to DARPA and to the Work Area 2 performers on a biannual basis. A mutually agreeable format for these reports will be developed during the Phase I effort of Work Area 2.

10.2.3 Work Area 2 Phase I Reporting

10.2.3.1 Phase I Kick-off Brief

Phase I will begin with a kick-off meeting at which time the selected performers will provide an oral briefing of their overall Program Plan (Task Element 1) as well as the performer-defined task (Task Element 2). Both of these are to be submitted in writing as part of the proposal. DARPA will provide both written and oral feedback.

10.2.3.2 Phase I Mid-term Brief

A mid-term oral briefing will be scheduled to provide an update of the overall Program Plan (Task Element 1) and a progress report on the performer-defined task (Task Element 2).

10.2.3.3 Phase I Final Brief and Written Report

A final oral and written report of both Task Element 1 and Task Element 2 will conclude Phase I. The updated Program Plan that results from Phase I, Task Element 1 will include a detailed cost proposal for Phase II. Phase I performers will be selected for Phase II based upon overall performance during Phase I as well as the final Phase I submissions, using the same criteria defined in Section 9.

10.2.4 Work Area 2 - Phase II Reporting and Deliverables

10.2.4.1 Sensor Systems

The ultimate product of the SIMBAD program is one or more fully integrated and well characterized sensor systems. Prototypes of such sensor systems are to be delivered under this program on a schedule to be determined based on the Program Plan.

10.2.4.2 Quarterly Briefings

Each team of performers will participate in a joint oral briefing, which will detail program progress, problems encountered and plans for the following quarter's activities.

10.2.4.3 Biannual Program Plan Update

At every other quarterly update, performers will provide both an oral and a written report on their updated Program Plan (Work Area 1). Revised cost proposals may be submitted at that time, as necessary. At these biannual Program Plan updates performers may propose additional team members to be incorporated into their teams with DARPA approval.

10.2.4.4 Annual Final Report

Performers will provide an annual written report that will be distributed at DARPA's discretion, and a briefing, which will be presented to a DARPA selected forum of Government, academic and industry participants.

10.2.4.5 Milestone-Driven Reporting

In addition to fixed-schedule reporting described above, each performer or performer team will have milestone-driven reporting defined as part of their Program Plan.

10.2.5 Work Area 3 Reporting

Performers under Work Area 3 will be required to provide a kick-off briefing to initiate the effort. At the completion of the effort, Work Area 3 performers will be required to provide a final written report and a final briefing to DARPA and at least one Phase I, Work Area 2 team.

10.2.6 Ownership of Products

The U.S. Government retains Government Purpose Rights to all output from this effort to include software, unless specific exceptions are negotiated. DARPA will entertain negotiations for exceptions of specific intellectual property associated with BW and CW sensor systems developed with support from this program. The Government may choose to disseminate some of the results publicly and may discuss them at conferences and at other public and private meetings. They may form the basis for subsequent BAA, RA, or other solicitations from DARPA or other Government organizations.